35 U.S.C.§102

Claims 1-10, 17 and 19-31 stand rejected under 35 USC 102(b) as being anticipated by Nakajima et al. This rejection is traversed as follows.

The present invention is directed to a method of manufacturing a semiconductor device that does not require a second heat treatment in an oxidative atmosphere after forming an aperture since an epitaxial growth portion becomes the intrinsic base layer. For example, claim 1 recites the step of "forming a base region forming epitaxial layer selectively on the semiconductor substrate that is exposed from the aperture". Claim 17 recites a step of "selective growing of a base region forming epitaxial layer on a semiconductor substrate that is exposed from a bottom of the emitter aperture". Claims 19 and 22 recites the step of "forming a base region forming epitaxial layer selectively on the semiconductor substrate at the opening". Finally, claim 27 recites a step of "forming a second silicon oxide film on the side surface of the base electrode forming silicon film that is exposed from the opening by performing an oxidation treatment".

Therefore, according to the present invention, the aperture is filled without requiring an additional oxidation step. On the other hand, Nakajima et al disclose a method of

manufacturing a semiconductor device according to the method recited at column 6, lines 31-61, which is reproduced as follows:

> The bore 11 shown in Fig. 2C is filled with a second poly-Si film 12, as shown in Fig. 2D. To be more specific, the second poly-Si film is deposited first by CVD on the entire surface under the conditions which permit filling the bore 11 with the poly-Si. Then, the deposited poly-Si film is etched back by reactive plasma etching until the CVD oxide film 9 and the wafer surface within the opening portion are exposed so as to form the second poly-Si film 12 as shown in Fig. 2D. The reactive plasma etching referred above is an isotropic chemical etching using a mixed gas of CF_4 and O_2 as an etchant.
>
> After formation of the second poly-Si film 12, a heat treatment is performed under an oxidative atmosphere so as to form a thermal oxide film 13 about 700 Å thick in a manner to cover the exposed surface of the epitaxial layer 3 and the side wall of the second poly-Si film 12, as shown in Fig. 2E. During the heat treatment, the boron doped in advance in the first poly-Si film 8 is diffused into the second poly-Si film 12 and into the epitaxial layer 3 to form a p^+-type outer base region 14. Then, boron ions are implanted under an accelerating energy of 20 KeV and at a dose of $2 \times 10^{13} cm^{-2}$ through the opening portion to form a p-type inner base region 15 within the epitaxial layer 3.
>
> Then, a reactive sputter etching is selectively applied to the oxide film 13 at the bottom portion of opening portion so as to remove the oxide film 13. As a result, the epitaxial layer 3 is exposed and an emitter diffusion window is formed. The reactive sputter etching noted above is an anisotropic etching by RIE using a mixed gas of CHF_3 and O_2 as an etchant.

According to Nakajima et al, after the formation of the second poly-Si film 12, a heat treatment is performed under an oxidative atmosphere to form a thermal oxide film 13 to cover the exposed surface of epitaxial layer 3 and the side wall of

the second poly-Si film 12, as shown in Fig. 2E. This oxide film is then subjected to a reactive sputter etching so as to remove a portion of oxide film 13 to expose epitaxial layer 3 and form an emitter diffusion window. However, such additional processes affect the reliability of devices that are formed. In particular, these treatments increase the occurrence of voids, raise junction resistance and decrease device capability. As such, it is submitted that the pending claims provide advantages not realized by Nakajima et al and are patentable over the disclosure of Nakajima et al.

Conclusion

In view of the foregoing remarks, Applicants contend that the above-identified application is now in condition for allowance. Accordingly, reconsideration and reexamination are respectfully requested.

Respectfully submitted,

Shrinath Malur
Registration No. 34,663
Attorney for Applicants

MATTINGLY, STANGER & MALUR
1800 Diagonal Rd., Suite 370
Alexandria, Virginia 22314
(703) 684-1120
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